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10/786,856	02/24/2004	Fuyun Ling	010104C1	3630

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EXAMINER	
PHU, PHUONG M	
ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
09/30/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/786,856	LING ET AL.	
	Examiner	Art Unit	
	Phuong Phu	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-13,15-21,23-29,31 and 32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9,11-13,15-17,19-21,23-25,27-29,31 and 32* is/are rejected.

7)☒ Claim(s) *10,18 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/2/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is responsive to the Amendment filed on 6/12/08. Accordingly, claims 9-13, 15-21, 23-29, 31 and 32 are currently pending; and claims 1-8, 14, 22 and 30 are canceled.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 9, 11, 12, 13, 15-17, 19-21, 23-25, 27-29, 31 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Paulraj et al (6,351,499), newly-cited.

-Regarding claim 9, Paulraj et al discloses a receiver unit in a multiple-input multiple-output (MIMO) communication system (see figures 4 and 5A), comprising:

at least one front end processor (82) (see figure 4) configured to receive at least one signal received via different spatial channels (see col. 9, lines 23-31);

a MIMO processor (86, 88) (see figure 4) coupled to the at least one front end processor and configured to provide estimates of at least some symbols in the at least one signal (see col. 9, lines 45-58); and

a channel quality estimator (84, 86, 90) (see figure 4) coupled to the MIMO processor and configured to estimate characteristics of a plurality of transmission channels used for data

transmission and to provide signal-to-noise and interference (SNR) information for one or more of the different spatial channels (see col. 9, line 32 to col. 10, line 16); and

a transmit data processor (100) (see figure 5A) configured to receive and process the SNR information transmission (see col. 9, lines 62-67, col. 11, lines 3-8).

-Regarding claim 11, Paulraj et al discloses that the channel quality estimator is configured to provide the SNR information based upon an average of SNR information of the received at least one signal (see col. 10, lines 13-16) wherein the received at least one signal is a OFDM signal (inherently comprising a plurality of OFDM subcarriers for forming the OFDM signal) (see col. 12, lines 25-35). (Said average of SNR information considered here equivalent with the limitation "an average of SNR information over a plurality of OFDM subcarriers of an Orthogonal Frequency Division Multiplexed (OFDM) signal received at the receiver".

-Regarding claim 12, Paulraj et al discloses that the channel quality estimator is configured to provide the SNR information based upon an average of SNR information over all of the different spatial channels (see figure 4, col. 9, line 58 to col. 10, line 16).

-Regarding claim 13, Paulraj et al discloses that the channel quality estimator is configured to provide the SNR information based upon an average of SNR information for pilot signals ""training patterns" received over all of the different spatial channels (see col. 9, lines 32-40).

-Regarding claim 15, Paulraj et al discloses that the channel quality estimator is configured to provide the SNR information based on a matrix processing (see col. 9, lines 32-

46), (said matrix processing considered here equivalent with the limitation "correlation matrix inversion (CCMI) processing").

-Regarding claim 16, Paulraj et al discloses that the channel quality estimator is configured to provide the SNR information based upon minimum mean square error (MMSE) processing (see col. 9, lines 48-51).

-Regarding claim 17, as similarly applied to claims 9, 11-16 set forth above and herein incorporated, Paulraj et al discloses a receiver unit in a multiple-input multiple-output (MIMO) communication system (see figures 4 and 5A), comprising:

means (82) (see figure 4) for receiving at least one signal received via different spatial channels;

means (86, 88) (see figure 4) for providing estimates of at least some symbols in the at least one signal;

means (84, 86, 90) (see figure 4) for estimating characteristics of a plurality of transmission channels used for data transmission;

means (90) (see figure 5A) for providing signal-to-noise and interference (SNR) information for one or more of the different spatial channels; and

a transmit data processor (100) (see figure 5A) configured to receive and process the SNR information for transmission.

-Claim 19 is rejected with similar reasons set forth for claim 11.

-Claim 20 is rejected with similar reasons set forth for claim 12.

-Claim 21 is rejected with similar reasons set forth for claim 13.

-Claim 23 is rejected with similar reasons set forth for claim 15.

-Claim 24 is rejected with similar reasons set forth for claim 16.

-Regarding claim 25, as similarly applied to claims 9, 11-16, 17, 19-21, 23, 24 set forth above and herein incorporated, Paulraj et al discloses a method (see figures 4 and 5A)for providing signal-to-noise and interference (SNR) for feedback in a wireless communication system, comprising:

procedure (82) (see figure 4) of receiving at least one signal received via different spatial channels;

providing (86, 88) (see figure 4) estimates of at least some symbols in the at least one signal;

procedure (84, 86, 90) (see figure 4) of estimating characteristics of a plurality of transmission channels used for data transmission;

procedure (90) (see figure 5A) of providing signal-to-noise and interference (SNR) information for one or more of the different spatial channels; and

procedure (100) (see figure 5A) of processing the SNR information for transmission.

-Claim 27 is rejected with similar reasons set forth for claim 11.

-Claim 28 is rejected with similar reasons set forth for claim 12.

-Claim 29 is rejected with similar reasons set forth for claim 13.

-Claim 31 is rejected with similar reasons set forth for claim 15.

-Claim 32 is rejected with similar reasons set forth for claim 16.

4. Claims 9, 15, 16, 17, 23, 24, 25, 31 and 32 are rejected under 35 U.S.C. 102(e) as being anticipated by Ling et al (6,961,388), previously cited.

-Regarding claim 9, see figure 1, col. 3, line 24 to col. 4, line 67, col. 8, lines 8 to col. 9, line 35, Ling et al discloses a receiver unit (comprising (150)) in a multiple-input multiple-output (MIMO) communication system (100), comprising:

at least one front end processor (154a,…, 154r) configured to receive at least one signal received via different spatial channels (see col. 3, line 66 col. 4, lines 67);

a MIMO processor (comprising (156)) coupled to the at least one front end processor and configured to provide estimates of at least some symbols in the at least one signal (see col. 4, lines 47-67); and

a channel quality estimator, (inherently included and associated with (150), and coupled to the MIMO processor via (150)), configured to determine/estimate partial or full-CSI for transmission channels (see col. 18, lines 49-53), and to provide signal-to-noise and interference (SNR) information for one or more of the different spatial channels (see col. 8, lines 27-31), wherein the full-CSI includes sufficient characterization of the propagation path (i.e., amplitude and phase) between all pairs of transmit and receive antennas for each transmission channel "frequency subchannel" used for data transmission, and the partial-CSI includes SNR for the spatial channels (see col. 17, lines 4-8), the SNR being link characteristics of the transmission channels (see col. 1, lines 34-37, col. 6, lines 45-50), (the full-CSI or the partial-CSI considered here equivalent with the limitation “characteristics of a plurality of

transmission channels used for data transmission"); and

a transmit data processor (inherently included and associated with (150) and the channel quality estimator) configured to receive and process the SNR information for transmission on a reverse link from receiver unit (150) to a transmitter unit (110) (see col. 8, lines 22-31, col. 17, lines 7-8, col. 18, lines 49-53).

-Regarding claim 15, Ling et al teaches that the channel quality estimator is configurable to provide the SNR information based on a correlation matrix inversion (CCMI) processing (see col. 8, lines 32-36).

-Regarding claim 16, Ling et al teaches that the channel quality estimator is configured to provide the SNR information based on a minimum mean square error (MMSE) processing, (see col. 8, lines 32-36).

-Regarding claim 17, as similarly applied to claims 9, 15, 16 set forth above and herein incorporated, Ling et al discloses a receiver unit comprising (150) (see figure 1) in a multiple-input multiple-output (MTMO) communication system (100), comprising:

means (154a,…, 154r) for receiving at least one signal received via different spatial channels;

means (providing (156) for providing estimates of at least some symbols in the at least one signal;

means, (inherently included and associated with (150)), for estimating partial or full-CSI as characteristics of a plurality of transmission channels for data transmission;

means (inherently included and associated with (150)) for providing signal-to-noise and interference (SNR) information for one or more of the different spatial channels; and

a transmit data processor (inherently included and associated with (150)) configured to receive and process the SNR information for transmission on a reverse link from receiver unit (150) to a transmitter unit (110).

-Claim 23 is rejected with similar reasons set forth for claim 15.

-Claim 24 is rejected with similar reasons set forth for claim 16.

-Regarding claim 25, as similarly applied to claims 9, 15, 16, 17, 23, 24 set forth above and herein incorporated, Ling et al discloses a method (see figure 1) for providing signal-to-noise and interference (SNR) for feedback in a wireless communication system, comprising:

procedure (154a,…, 154r) of receiving at least one signal received via different spatial channels;

procedure (comprising (156)) of providing estimates of at least some symbols in the at least one signal;

procedure for estimating partial or full-CSI as characteristics of a plurality of transmission channels used for data transmission (see col. 18, lines 49-53);

procedure of providing signal-to-noise and interference (SNR) information for one or more of the different spatial channels (see col. 8, lines 27-31); and

procedure of processing the SNR information for transmission on a reverse link from receiver unit (150) to a transmitter unit (110) (see col. 8, lines 22-31, col. 17, lines 7-8, col. 18, lines 49-53).

-Claim 31 is rejected with similar reasons set forth for claim 15.

-Claim 32 is rejected with similar reasons set forth for claim 16.

Allowable Subject Matter

5. Claims 10, 18 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

6. Applicant's arguments filed 6/12/08 have been fully considered.

–As results, the previous rejections, under 35 USC 103, to claims 11-13, 19-21 and 27-29 as being unpatentable over Ling et al, have been withdrawn.

-Applicant's arguments with respect to claims 9, 15, 16, 17, 23, 24, 25, 31 and 32, however, are not persuasive.

The applicant mainly argues that (i) with respect to claim 9, in Ling et al, a channel quality estimator and a transmit data processor are not inherently included in the receiver unit (150); (ii) with respect to claim 17, in Ling et al, means for estimating characteristics of a plurality of transmission channels used for data transmission; means for providing signal-to-noise and interference (SNR) information for one or more of the different spatial channels; and a transmit data processor configured to receive and process the SNR information for transmission are not inherently included, and (iii) with respect to claim 25, in Ling et al, steps of estimating characteristics of a plurality of transmission channels used for data transmission; providing signal-to-noise and interference (SNR) information for one or more of the different spatial channels; and processing the SNR information for transmission are not inherently included.

Regarding part (i), the examiner respectfully, disagrees. As explained above in this Office Action, Ling et al teaches the receiving unit comprising a receiving part (150). Ling et al further teaches a first procedure which is configured to determine/estimate partial or full-CSI for transmission channels (see col. 18, lines 49-53), and to provide signal-to-noise and interference (SNR) information for one or more of the different spatial channels (see col. 8, lines 27-31), wherein the full-CSI includes sufficient characterization of the propagation path (i.e., amplitude and phase) between all pairs of transmit and receive antennas for each transmission channel "frequency subchannel" used for data transmission, and the partial-CSI includes SNR for the spatial channels (see col. 17, lines 4-8), the SNR being link characteristics of the transmission channels (see col. 1, lines 34-37, col. 6, lines 45-50), (the full-CSI or the partial-CSI considered here equivalent with the limitation "characteristics of a plurality of transmission channels used for data transmission"). In Ling et al, a device, (considered here equivalent with "a channel quality estimator"), which may or may be included in (150), must inherently exist in order to carry out or perform said first procedure otherwise said procedure cannot be carried out or performed as required. Further, Ling et al teaches a second procedure configured to receive and process the SNR information for transmission on a reverse link from receiver unit (150) to a transmitter unit (110) (see col. 8, lines 22-31, col. 17, lines 7-8, col. 18, lines 49-53). In Ling et al, a device, (considered here equivalent with "a transmit data processor"), which may or may be included in (150), must inherently exist in order to carry out or perform said second procedure otherwise said procedure cannot be carried out or performed as required.

Regarding part (ii), the examiner also disagrees with similar reasons set forth for part (i).

Regarding part (ii), the examiner also disagrees. See the explanation stated in the rejection to claim 25 set forth above in this Office Action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuong Phu whose telephone number is 571-272-3009. The examiner can normally be reached on M-F (8:00 AM - 4:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Phuong Phu
Primary Examiner
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